

What is claimed is:

1. An optical waveguide switch, comprising:

plurality of optical waveguides including at least two layers having an interlayer spacing kept for not permitting a spontaneous  
5 occurrence of a proximity effect perturbation;

gap section formed in a predetermined axial length between paired upper and lower optical waveguides; and

optical waveguide drive for driving at least one of the paired optical waveguides to move toward the other optical waveguide facing  
10 said optical waveguide within said gap section; wherein

switching or translation of optical signals propagating through said optical waveguides takes place by coupling said optical waveguides with each other through movement of said optical waveguides within said gap section by said optical waveguide drive to a position where the  
15 proximity effect perturbation occurs.

2. The optical waveguide switch according to claim 1, wherein said optical waveguides includes a plurality of optical waveguides formed in parallel within a same layer, and said optical waveguides within the same  
20 layer are simultaneously moved by said optical waveguide drive toward said optical waveguides formed in the opposite layer.

3. The optical waveguide switch according to claim 1, wherein said optical waveguides are formed in a multi-layered arrangement, and an  
25 optical waveguide formed in an intermediate layer is selectively moved by said optical waveguide drive toward an optical waveguide formed in an upper or lower layer facing said intermediate-layered optical waveguide.

4. The optical waveguide switch according to claim 1, wherein  
30 optical waveguides in each layer are isolated from each other through a photoconductive intermediate layer of a thickness substantially equal to

said gap section with exception to an area where said gap section is formed.

5. The optical waveguide switch according to claim 4, wherein said  
5 intermediate layer is formed with a photoconductive material whose refractive index is approximately equal to that of a clad material of said optical waveguides.

6. The optical waveguide switch according to claim 1, wherein said  
10 gap section is filled with liquid.

7. The optical waveguide switch according to claim 1, wherein said  
optical waveguide drive includes electrode layers formed with a  
photoconductive electrode material facing each other and formed on  
15 optical waveguides opposing each other, within said gap section, said optical waveguide drive causing an electrostatic force between said electrode layers by application of a drive voltage to move said optical waveguides by said electrostatic force to a position where the proximity effect perturbation arises.

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8. The optical waveguide switch according to claim 7, wherein at least one of said electrode layers has a short-circuit proof layer formed on a surface thereof.

25 9. The optical waveguide switch according to claim 1, wherein said optical waveguide drive makes said optical waveguides facing each other move at least to both a position where said optical waveguides have contact with each other and an intermediate position where the proximity effect perturbation arises.

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10. A method for manufacturing an optical waveguide switch,

comprising the steps of:

forming a first optical waveguide layer having a core layer sealed by a lower clad layer and an upper clad layer comprising photoconductive resin material;

5        forming a first electrode layer on an upper clad layer of said first optical waveguide layer with a photoconductive electrode material;

forming an intermediate layer of a predetermined thickness on a predetermined area extending across the upper clad layer of said first optical waveguide layer and said first electrode layer;

10        filling a fill-up material into a gap section comprising a non-forming area of said intermediate layer on the upper clad layer of said first optical waveguide layer;

forming a second electrode layer facing said first electrode layer with a photoconductive electrode material across said intermediate layer and said fill-up material layer;

15        forming a second optical waveguide layer facing said first optical waveguide layer and having a core layer sealed by a lower clad layer and an upper clad layer comprising a photoconductive resin material on said upper clad layer including said second electrode layer,; and

20        forming said gap section by removing said fill-up material from said fill-up material layer;

wherein said optical waveguide switch is manufactured, in which said first optical waveguide layer and said second optical waveguide layer face each other by having an interlayer spacing kept for not permitting a spontaneous occurrence of a proximity effect perturbation, and optical  
25        signal switching or translation takes place by moving said first and second optical waveguide layers to a position where a proximity effect perturbation arises, by means of an electrostatic force generated by application of a voltage between said first electrode layer and said second  
30        electrode layer.

11. The method for manufacturing an optical waveguide switch according to claim 10, wherein optical waveguides are formed in multiple layers on the upper clad layer of said second optical waveguide layer by successively applying steps ranging from the step of forming said first  
5 optical waveguide layer to the step of forming said gap section.

12. The method for manufacturing an optical waveguide switch according to claim 10, wherein said first optical waveguide layer forming step and said first electrode layer forming step, as well as said second  
10 optical waveguide forming step and said second electrode layer forming step, comprise a plurality of optical waveguides formed in parallel with one another within a same layer.

13. The method for manufacturing an optical waveguide switch  
15 according to claim 10, wherein said intermediate layer forming step includes forming said intermediate layer with a photoconductive material having a refractive index substantially equal to a clad material for said optical waveguides.

20 14. The method for manufacturing an optical waveguide switch according to claim 10, wherein:

said intermediate layer forming step includes forming a first via hole open through said intermediate layer up to said first electrode layer;

said second optical waveguide layer forming step includes forming  
25 a second via hole open through said lower clad layer and said upper clad layer up to said second electrode layer, and a third via hole communicating with said first via hole; and

conduction treatment is applied to said first, second and third via holes to form, on said upper clad layer, a via hole for connection between  
30 said first electrode layer and said second electrode layer.

15. The method for manufacturing an optical waveguide switch according to claim 14, wherein said fill-up material filling step includes filling said gap section and said first via hole with a fill-up material comprising copper.

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16. The method for manufacturing an optical waveguide switch according to claim 15, wherein said fill-up material filling step further includes polishing said upper clad layer of said first optical waveguide layer and said fill-up material layer so as to constitute a flat plane with one another.

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17. The method for manufacturing an optical waveguide switch according to claim 15, wherein said second optical waveguide layer forming step includes forming an etching hole opened through said lower clad layer and said upper clad layer up to said fill-up material layer, and removing said fill-up material from said gap section by applying etching to said fill-up material layer through said etching hole.

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18. The method for manufacturing an optical waveguide switch according to claim 17, wherein said second optical waveguide layer forming step further includes the steps of filling liquid into said gap section through said etching hole, and closing said etching hole.

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19. The method for manufacturing an optical waveguide switch according to claim 10, wherein at least one of said first electrode layer forming step and said second electrode layer forming step includes forming a short-circuit proof layer on a surface of said electrode layer.

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